Space Weather Forecast

Issued on Wednesday, 24 July 2024 at 13:11 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1-G2/Minor-Moderate likely with a low confidence chance of G3/Strong Geomagnetic Storms 24 Jul. Chance of R1 Radio Blackouts throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Activity has remained Moderate, with a Moderate-class flare observed at 24/0742UTC from a sunspot region located in the southwest quadrant. The two prominent spots in the southwest have shown little change. The long but sparsely populated spot in the southeast, has a complex trailing portion consisting of a delta, with some recent minor growth evident in its intermediate portion. There are three spots in the far east of the disc, all of which appear simple at present even given the flaring from near AR3764 just south of the equator on 23 Jul. All other remaining regions are small or simple.

There were three Coronal Mass Ejections (CMEs) observed in coronagraph imagery in the past 24 hours. The first was a full halo CME from the far-side of the Sun early on the 23 Jul, which produced a minor (S1) proton storm event, which has now ended. The second was observed at 23/0400UTC off the southwest limb, associated with a Common-class flare, which has been analysed as a likely miss ahead of Earth arriving on 26 Jul. The final CME was from the southeast limb, associated with a Moderate-class flare near a sunspot region located close to the east limb at 23/1430UTC. This gave a wide and moderately fast CME, perhaps with low confidence of glancing impacts at Earth possible either late 26 Jul or early on the 27 Jul.

Solar Wind / Geomagnetic Activity: The solar wind was at mostly background conditions until a weak CME (thought to be from 19 Jul) arrived around 23/1950UTC. Speeds remained slow throughout, but jumped from 250 km/s to a peak of around 340 km/s. The Earth's magnetic field was weak, becoming Moderate to Strong after 23/1950UTC. The important north-south component was almost entirely positive (northward) after 23/1950UTC. The net result of the above solar wind measures was for mostly Quiet (Kp1-2) geomagnetic indices, with an Unsettled (Kp3) interval observed 23/1800-2100UTC.

Energetic Particles / Solar Radiation: Radiation levels reached S1/Minor Storm threshold early on the 23 Jul due to a large full halo CME on the far-side of the Sun. This event has now ended, with radiation levels returning to background.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate activity is likely throughout. While a particularly active sunspot region has now departed the facing side, its loss is in some way compensated for by the flaring into life of a second group in the southeast.

Solar Wind /Geomagnetic Activity: No coronal holes or their fast winds feature in the forecast period. Earth is currently experiencing a rather slow and weak coronal mass ejection. Two

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further coronal mass ejections are expected in the period. The first and most notable, is expected to arrive at Earth during day 1 (24 July), most likely during the first part of the day. Speeds may reach enhanced or strong, around 500-700 km/s during this event. The second was a wide a moderately fast coronal mass ejection, with low confidence of glancing impacts at Earth on or around 26 Jul.

Geomagnetic activity will likely become enhanced day 1 (24 Jul) with G1-G2/Minor-Moderate storms likely and a chance of G3/Strong storms. Geomagnetic activity should begin to wane into day 2 (25 Jul), with Quiet conditions likely. There is a slight chance of G1 Minor Storms should the CME from 23 Jul arrive on day 3 (26 Jul).

Energetic Particles / Solar Radiation: Solar radiation levels have returned to background levels, after the recent S1 minor proton storm event. Slight Chance of rising above the S1/Minor Storm threshold in response to any notable flares throughout the period.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	60	10	20	5
Strong	G3	No	30	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	50	50	50	50
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	Yes	20	20	20	20
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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